

University of Groningen

PDRT-SANDBOX

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Document Version

Publisher's PDF, also known as Version of record

Publication date:

2014

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Venhuizen, N., & Brouwer, H. (2014). *PDRT-SANDBOX: Implementing Projective Discourse Representation Theory*. Poster session presented at 18th Workshop on the Semantics and Pragmatics of Dialogue (SemDial-DialWatt 2014), Edinburgh, United Kingdom.

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Projective Discourse Representation Theory (Venhuizen et al., 2013; in prep)

An extension of DRT (Kamp, 1981; Kamp & Reyle, 1993) with **projection variables** to account for projection phenomena, e.g., **presuppositions** (Venhuizen et al., 2013) and Potts' (2005) **conventional implicatures** (Venhuizen et al., 2014).

Projection variables indicate the interpretation site of semantic content, so all content stays *in situ* during composition.
> Projected content is indicated by free pointers, or pointers bound to the label of a non-local, accessible PDRS.

Challenge: projection variables affect the **construction procedure** and definition of **accessibility** non-trivially.

input/output formats

PDRT-SANDBOX: a Haskell library that implements PDRT and DRT

A modular and flexible NLP library that incorporates machinery to build, combine, and translate structures from PDRT as well as DRT ... and **much more!**

```
Prelude Data.PDRS> let johnisvegan = PDRS 1 [(1,2)] [PRef 2 (PDRSRef "x"), PCon 2 (Rel (PDRSRef "John") (PDRSRef "x")), PCon 1 (Rel (PDRSRef "vegan") (PDRSRef "x"))]
Prelude Data.PDRS> let notjohnlikesmeat = stringToPDRS "<1,3>,{(1,not <3,{(2,x),(3,y)},{(2,John(x)),{(3,meat(y))},{(3,like(x,y))},{(3,2)}}}>}"
Prelude Data.PDRS> Debug notjohnlikesmeat

PDRS 1 [(1,2)] [PCon 1 (Neg (PDRS 3 [(3,2)] [PRef 2 (PDRSRef "x"), PRef 3 (PDRSRef "y")] [PCon 2 (Rel (PDRSRef "John") (PDRSRef "x")), PCon 3 (Rel (PDRSRef "meat") (PDRSRef "y")), PCon 3 (Rel (PDRSRef "like") (PDRSRef "x"), PDRSRef "y"])]))]
Prelude Data.PDRS> Set johnisvegan
<1,<2,x>,<3,John(x)>,<4,vegan(x)>,<5,{(1,2)}>
Prelude Data.PDRS> Boxes notjohnlikesmeat

[1]
  [3]
    2 - x
    3 - y
    1 - John(x)
    3 - meat(y)
    3 - like(x,y)
    3 = 2
```

```
Prelude Data.PDRS> printMerge johnisvegan notjohnlikesmeat

[1]
  [3]
    2 - x
    3 - y
    1 - John(x)
    3 - meat(y)
    3 - like(x,y)
    3 = 2

[1]
  [3]
    2 - x
    3 - y
    1 - John(x)
    3 - meat(y)
    3 - like(x,y)
    3 = 2

[1]
  [3]
    2 - x
    3 - y
    1 - John(x)
    3 - meat(y)
    3 - like(x,y)
    3 = 2

Prelude Data.PDRS> printMerge (PDRS 1 [(1,2)] [PRef 1 (PDRSRef "y")] [PCon 1 (Rel (PDRSRef "Mary") (PDRSRef "y"))]) (PDRS 3 [(3,2)] [PCon 3 (Rel (PDRSRef "vegetarian") (PDRSRef "y"))])

[1]
  [3]
    1 - y
    3 - vegetarian(y)
    1 - Mary(y)
    3 = 1

Prelude Data.PDRS> let maryisvegetarian = (PDRS 1 [(1,2)] [PRef 1 (PDRSRef "y")] [PCon 1 (Rel (PDRSRef "Mary") (PDRSRef "y"))]) <<<< (PDRS 3 [(3,2)] [PCon 3 (Rel (PDRSRef "vegetarian") (PDRSRef "y"))])
Prelude Data.PDRS> Linear $ maryisvegetarian <<<< johnisvegan
4: [<1,y>,<2,x>,<3,John(x)>,<4,vegetarian(y)>,<2,John(x)>,<4,vegan(x)>] [(4,1),(4,2)]
Prelude Data.PDRS> it maryisvegetarian <<<< johnisvegan
maryisvegetarian <<<< johnisvegan :: PDRS
```

lambda-abstractions

```
Prelude Data.PDRS> let because pdr1 pdr2 = PDRS 5 [(1,2)] [PRef 5 (PDRSRef "p1"), PRef 5 (PDRSRef "p2")] [PCon 5 (Prop (PDRSRef "p1") pdr1), PCon 5 (Prop (PDRSRef "p2") pdr2)], PCon 5 (Rel (PDRSRef "because") (PDRSRef "p1"), PDRSRef "p2")]
Prelude Data.PDRS> it because
because :: PDRS -> PDRS -> PDRS
Prelude Data.PDRS> because
[5]
  5 - p1
  5 - p2
  5 - because(p1,p2)

Prelude Data.PDRS> Linear (because johnisvegan notjohnlikesmeat)
5: [<5,p1>,<5,p2>] [<5,p1: 1: [<2,x>,<2,John(x)>,<4,vegan(x)>] [(1,2)]>,<5,p2: 1: [(1,3)>,<3,{(2,x),(3,y)},{(2,John(x)),{(3,meat(y))},{(3,like(x,y))},{(3,2)}}>] ]>,<5,because(p1,p2)>]
Prelude Data.PDRS> pdrToDRT notjohnlikesmeat (PDRT to DRT)

x
  y
  meat(y)
  like(x,y)
  John(x)

Prelude Data.PDRS> pdrToFOL notjohnlikesmeat
3x(¬3y(meat(w,y) A like(w,x,y)) A John(w,x)) (PDRT to FOL)
```

Implementation

Accessibility of PDRT referents is defined using a **projection graph**.

Unresolved lambda-(P)DRSs (Muskens, 1996) as Haskell functions.

Various **input** (set-theoretic, sandbox syntax, Boxer's Prolog syntax; Bos, 2003), and **output** formats (pretty printing of (P)DRS representations, and non-recursive P-Tables).

Application

Forming an NLP toolchain together with a syntactic parser (à la C&C tools and Boxer; Curran et al., 2007), or reasoning about semantic representations using a theorem prover or model checker.

